Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	GEN Docket No. 90-314
	)	ET Docket No. 92-100
Amendment of the Commission's Rules to Establish New Personal Communications Services	)	RM-7140, RM-7175, RM-7617, RM-7618, RM-7760, RM-7782, RM-7860, RM-7977, RM-7978,
	)	PP-35 through PP-40, PP-79 through PP-85

TO: The Commission

COMMENTS OF CABLEVISION SYSTEMS CORPORATION

CABLEVISION SYSTEMS
CORPORATION

Charles D. Ferris
James A. Kirkland
Keith A. Barritt
Mintz, Levin, Cohn, Ferris,
Glovsky & Popeo, P.C.
701 Pennsylvania Ave., N.W.
Suite 900
Washington, D.C. 20004
(202) 434-7300

Its attorneys

Date: November 9, 1992

SUMMARY

In June 1989, Cablevision Systems Corporation ("Cablevision"), began to study in detail how wireless Personal Communications Services ("PCS") might be developed in innovative ways to take advantage of Cablevision's state-of-the-art cable television facilities, and has experimented with PCS services pursuant to four FCC authorizations for nearly two years. Based on its extensive experience, Cablevision is convinced that PCS holds great potential to fill a demonstrated demand for fully mobile, multi-faceted communications.

The rules adopted in this proceeding, however, will have a tremendous effect on both the pace of PCS development and the ultimate success of PCS. The critical overriding consideration in this proceeding must be to ensure that the spectrum awarded to individual licensees and the market structure created and shaped by the Commission's PCS rules will ensure the prompt, successful and uniform introduction of PCS. These comments will focus on a number of issues which Cablevision considers to be critical to ensuring the success of PCS.

The Commission should carefully consider the amount of bandwidth to be provided to each PCS licensee, in light of the general prevalence of microwave users in the frequency bands which the Commission proposes to license for PCS. To avoid

unduly handicapping PCS development, the Commission should not ignore the very real possibility that frequency sharing technologies may not be a panacea for licensees seeking to effectively utilize the bandwidth allocated to them, and the further possibility that the economic costs associated with negotiated relocation of existing microwave users may be difficult for PCS licensees to bear in the developmental stages of PCS.

In the alternative, the Commission may wish to reconsider the basic relationships among bandwidth allocated, number of licensees per market and the "grandfathering" of selected incumbent users of the spectrum. For example, Cablevision's studies suggest that it may be necessary, depending upon the bandwidth and licensee criteria selected, to move all users out of the 1850-1990 band over some period of time.

State and local regulation of PCS should be preempted to avoid the prospect of conflicting and burdensome regulations.

Potential anti-competitive conduct of the local exchange carriers and others should be forestalled before it begins.

Finally, Cablevision believes that an infrastructure set-aside in the licensing process for cable television systems can best promote the efficient use of increasingly scarce spectrum by taking advantage of the pervasive wireline infrastructure that cable already has in place.

TABLE OF CONTENTS

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TO: The Commission

COMMENTS OF CABLEVISION SYSTEMS CORPORATION

Cablevision Systems Corporation ("Cablevision"), by its attorneys, hereby submits its comments in response to the Notice of Proposed Rulemaking adopted by the Federal Communications Commission in the above-captioned rulemaking proceeding.[1/]

INTRODUCTION

Cablevision Systems Corporation ("Cablevision"), both directly and through a number of subsidiaries and affiliated companies, is a leading provider of cable television service, with major cable systems in the northeastern and midwestern United States. Cablevision has a long history of innovation in

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1/ In the Matter of Amendment of the Commission's Rules to Establish New Personal Communications Services, Notice of Proposed Rule Making and Tentative Decision, FCC 92-333 (rel. Aug. 14, 1992) ("NPRM").

the provision of cable television services, ranging from the introduction of advances in the physical plant and hardware utilized to provide cable service to the development and introduction of creative programming services for delivery over its cable systems and those of other cable operators. Cablevision has also been in the forefront of the development and implementation of two-way communications capabilities that could potentially be combined synergistically with its current and planned cable television delivery facilities. As part of these efforts, in June 1989, Cablevision began to study in detail how wireless Personal Communications Services ("PCS") might be developed in innovative ways to take advantage of Cablevision's state-of-the-art cable television facilities. In September 1990, Cablevision filed for requests for experimental authorizations to provide PCS services in the New York City, Boston, Chicago and Cleveland metropolitan areas.

Cablevision Systems Corporation ("Cablevision") has since operated under its experimental PCS licenses for nearly two years. Cablevision's initial tests focused on the transmission of high speed, complex digital signals with live cable plant, in order to demonstrate that cable plant currently in place could provide a suitable networking architecture and infrastructure for PCS. Following these initial tests, Cablevision turned its attention to experimentation with and development of the capabilities of distributed antenna technology to serve as the radio frequency link in a multimedia PCS service. Cablevision

has substantially advanced the capabilities of pole and strand mounted distributed antenna technologies by conducting independent research, and funding research with NEXUS Engineering, to the point where Cablevision was the first to demonstrate carriage of PCS calls at vehicular speeds. Based on its extensive experience, Cablevision is convinced that PCS holds tremendous potential to fill a demonstrated demand for fully mobile, multi-faceted mobile communications.

Virtually everyone involved in PCS would agree with this basic proposition. The rules adopted in this proceeding, however, will have a tremendous effect on both the pace of PCS development and the ultimate success of PCS services. The critical overriding consideration in this proceeding must be to ensure that the spectrum awarded to individual licensees and the market structure created and shaped by the Commission's PCS rules will ensure the prompt and successful introduction of PCS services by PCS licensees. These comments will focus on a number of issues which Cablevision considers to be critical to ensuring the success of PCS. First, the Commission should carefully consider the amount of bandwidth to be provided to each PCS licensee, in light of the general prevalence of microwave users in the frequency bands which the Commission proposes to license for PCS. To avoid unduly handicapping PCS development, the Commission should not ignore the very real possibility that frequency sharing technologies may not be a panacea for licensees seeking to effectively utilize the bandwidth allocated to them,

and the further possibility that the economic costs (both out of pocket costs and operational penalties) associated with negotiated relocation of existing microwave users may be difficult for PCS licensees to bear in the developmental stages of introduction of PCS service. State regulation of PCS should be preempted to avoid the prospect of conflicting and burdensome regulations. Potential anti-competitive conduct of the local exchange carriers and others should be forestalled before it begins. Furthermore, Cablevision believes that the Commission can best promote the efficient use of increasingly scarce spectrum, and take advantage of the pervasive wireline infrastructure that cable television already has in place, by considering an infrastructure set-aside in the licensing process.

I. THE COMMISSION MUST TAKE INTO ACCOUNT THE ECONOMIC AND TECHNICAL REALITIES OF SPECTRUM SHARING IN DETERMINING THE NUMBER OF PCS LICENSEES IN A MARKET AND THE BANDWIDTH ALLOCATED TO EACH

One of the most crucial factors in determining whether PCS licensees will be able to realize the tremendous potential of PCS in the marketplace will be the immediate availability of adequate spectrum to such licensees to be utilized in providing service.[2/] In its comments in the emerging technologies spectrum proceeding, Cablevision argued that rather than imposing a specific relocation timetable for existing users, the Commission should instead develop criteria under which existing

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[2/] NPRM at ¶ 35.

users would be required to relocate, or convert to secondary status, only when it is determined that there is both an actual need for the frequencies and there is no reasonable technical means to permit co-sharing on a co-primary basis of frequencies.

Cablevision continues to believe that establishment of these conditions as a prerequisite to loss of co-primary status or relocation of incumbents provides the most appropriate balance of the need for spectrum for PCS and the legitimate needs of incumbent users. Since that time, however, Cablevision's experience under its experimental PCS licenses with spread spectrum technology has identified potential limitations on spectrum sharing technologies, standing alone, as a means to permit efficient PCS operations in the presence of significant numbers of incumbent microwave users.[3/] Similarly, the Commission should carefully consider the potential economic burden to both new and incumbent users likely to be associated with its relocation proposals, since this could constitute a major cost of creating a viable PCS business.[4/]

[3/] See Exhibit I for a discussion of Cablevision's preliminary technical findings.

[4/] A further problem with forced relocation that will have to be addressed is the situation where the incumbent user is located on, or "straddles," the dividing line between two PCS channel blocks (e.g. where an incumbent is licensed at 1865 MHz). Exhibit II identifies several such situations in specific markets. In such cases questions arise as to which PCS licensee has negotiating rights with the incumbent, and how the costs of such relocation should be allocated between the two PCS licensees, both of whom will benefit from the relocation of the incumbent.

Furthermore, for a truly competitive environment to develop, it is imperative that each competitor have adequate resources to fully explore the boundaries of PCS's potential. The alternative might only encourage niche marketing, leaving each market segment dominated by a few licensees per service area, with no real competition between the providers of different service offerings. The Commission has recognized that such niche marketing is a possibility for PCS providers, NPRM at ¶ 94, a possibility that could be carried to extremes if adequate spectrum is not made available to each licensee. For example, if limited spectrum is provided to five licensees per market, one might focus almost exclusively on the provision of voice services, one on mobile facsimile service, one on data transmission, one on wireless office applications, and one on utility meter reading, with limited competition between them.

These issues must necessarily be considered in determining the number of licensees in each market. In the NPRM, the Commission suggested that the more licenses issued in each market, the less spectrum each licensee may receive.[5/] To the extent that such a tradeoff must be made, Cablevision urges the Commission to focus primarily on the amount of spectrum a viable PCS licensee will require rather than on the optimum number of competitors per market in the abstract. It would make little sense for the Commission to authorize a service where many competitors are left to flounder for want of adequate spectrum.

[5/] NPRM at ¶ 36.

The Commission should carefully consider the pervasiveness of incumbent microwave users in the 1850-1990 MHz band before finalizing this proposal. Although Cablevision believes that the Commission's preferred option to provide 30 MHz of spectrum to each licensee may be adequate, there are many instances where the existance of incumbent users may render this problematic. For example, Cablevision's experience in New York indicates that if three PCS licensees are each assigned only 30 MHz, in the 1850-1895 and 1930-1975 bandwidths as the Commission has proposed, many licensees would be unable to operate viable systems due to the interference or blockage from existing users. Moreover, this problem is compounded by the fact that a significant number of incumbent users (e.g. government entities) would be exempt from any forced relocation. However, if the bandwidths are expanded slightly to 40 MHz for each of three licensees, using the 1850-1910 and 1930-1990 bandwidths, this problem is dramatically reduced, as licensees would often be able to engineer viable systems, with at least 10 MHz capacity in both directions, around incumbent users.

II. PCS SHOULD BE REGULATED AS A PRIVATE CARRIER

Cablevision strongly believes that PCS should be treated as a private carrier service subject to federal preemption of entry and rate regulation. Without such preemption, PCS licensees would face the tremendous burden of attempting to comply with myriad state and local regulations, quite possibly even in the

same service area, as all of the proposed definitions of a service area potentially cross state lines.[6/] The potential for conflicting regulations could even put a PCS licensee in a position where it is impossible to comply with multiple regulations, and in any case would certainly impede the rapid development of PCS and the provision of this innovative service to the public.

Although states in recent years have demonstrated little interest in regulating cellular services, early indications are that states are interested in regulating PCS. For example, New York issued a Statement of Policy on October 30, 1992 on the potential regulation of PCS, which covers such issues as interconnection standards, assuring the universal availability of basic service, service quality standards, and consumer privacy protection. Regulation of such matters by the individual states could significantly inhibit PCS development.

III. THE COMMISSION SHOULD ADOPT RULES TO ASSURE ADEQUATE INTERCONNECTION WITH THE PUBLIC SWITCHED TELEPHONE NETWORK

Cablevision strongly supports the Commission's proposal to confirm explicitly that PCS licensees have a federally protected right to interconnect with the public switched telephone network.[7/] Without such a right of interconnection, PCS will face the very real potential that local exchange carriers will

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[6/] See NPRM at ¶ 60.

[7/] NPRM at ¶ 99.

attempt to stifle competition to their own services by offering inferior interconnection and excessive access charges, and PCS might never fulfill its potential to provide full-service mobile communications.

Whatever the type of interconnection the FCC ultimately decides upon, a streamlined procedure to assure prompt dispute resolution should be an integral part of the decision. Clear time frames for detailed responses to interconnection requests should be required, as well as expedited handling of complaints, perhaps including alternative dispute resolution or mediation subject to review by FCC staff.[8/]

IV. LOTTERIES SHOULD BE WEIGHTED IN FAVOR OF PARTIES WHO HAVE CONTRIBUTED TO THE DEVELOPMENT OF PCS

Cablevision agrees with the Commission that comparative hearings are too slow and cumbersome to be used as a method to license PCS providers.[9/] Lotteries are preferable, assuming the continued lack of statutory authority for competitive bidding. In conducting such lotteries, the Commission has an opportunity to reward applicants who have demonstrated a commitment to the service and who have been involved in its

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[8/] Such an approach would be consistent with the policy of the Administrative Dispute Resolution Act to promote faster and less expensive resolution of disputes, Pub. L. No. 552, 101st Cong. 2d Sess., and with the Commission's interpretation of that Act. In the Matter of Use of Alternative Dispute Resolution Procedures, 6 FCC Rcd 5669 (1991).

[9/] NPRM at ¶ 82.

technical development. To achieve this, Cablevision believes that the Commission should, within the framework of lotteries, grant significant weighting in favor of parties who have contributed to the development of PCS through significant activities under experimental licenses. Such an approach would also help to assure the rapid deployment of PCS systems, as those applicants who have already invested substantial time and resources in developing and defining this emerging technology in PCS are in a relatively better position to provide service than is a chronological or technical newcomer to the field.

Such an approach would provide a beneficial complement to the Commission's efforts to reward parties who have devoted substantial efforts to the development of PCS innovations through pioneer preferences.[10/] In the PCS pioneer preference proceeding, however, the Commission apparently felt the need to strictly limit the number of preferences awarded.[11/] It does not follow from this, however, that those whose developmental efforts were found not to satisfy the demanding standard which the Commission applied should be treated as equivalent to mere

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10/ In the Matter of Establishment of Procedures to Provide a Preference to Applicants Proposing an Allocation for New Services, 6 FCC Rcd 3488 (1991), recon., 7 FCC Rcd 1808 (1992).

11/ Amendment of the Commission's Rules to Establish New Personal Communications Services, FCC No. 92-467 (Released November 6, 1992).

speculators and applications mill applicants in any lottery procedure.[12/]

There is ample precedent for weighting a lottery in favor of specific applicants. For example, pursuant to statute, the Commission has traditionally awarded additional chances in a lottery to minority applicants.[13/] Similarly, in the context of the Instructional Television Fixed Service, the Commission has adopted a modified paper hearing procedure in which applicants are awarded points for certain qualifying factors deemed important by the Commission.[14/] Cablevision does not, of course, advocate comparative hearings, even on paper. Nonetheless, it is clear that the Commission has authority to attempt to achieve policy objectives, such as rewarding developmental investments and speeding the provision of service

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12/ Cablevision was among the parties requesting a pioneer preference for the development of significant innovations in PCS, and intends to argue for the award of an additional preference in its comments in response to the Commission's tentative decision awarding pioneer preferences to three applicants. Whether or not Cablevision receives a pioneer preference, however, for the reasons set out in text, Cablevision believes weighting the lottery in favor of parties who have made significant contributions would serve the public interest.

13/ See 47 C.F.R. § 1.1622, adopted in In the Matter of Amendment of the Commission's Rules to Allow the Selection From Among Certain Competing Applicants Using Random Selection or Lotteries Instead of Comparative Hearings, 93 FCC 2d 952 (1983), recon., 57 R.R. 2d 427 (1984).

14/ 47 C.F.R. § 74.913. Similarly, in the initial comparative hearing procedures for cellular licensing, the technical merits of an applicant's proposal were accorded weight as a comparative factor. See, e.g., MCI Cellular Telephone Co., 96 FCC 2d 1040 (1983) (applying comparative criteria adopted in Cellular Communications System, 86 FCC 2d 469 (1981)).

to the public, by increasing the chances of success of certain classes of applicants through a lottery procedure, and the Commission should do so here.

V. COMMISSION SHOULD USE LATAS AS THE GEOGRAPHIC BASIS FOR THE AWARD OF PCS LICENSES

Another important determinent of the PCS market structure is the geographic size of market areas used as the basis for the licensing of PCS. Cablevision agrees that licensing on the basis of 734 metropolitan and rural service areas, as was done with cellular, would be of little use other than to generate needless transaction costs in consolidation. It appears very likely, as in the case of cellular, that PCS service will be provided on a broader geographic basis. On the other hand, very large regional license areas would necessarily entail greater entry and startup costs for companies such as Cablevision which are very interested in participating in the provision of PCS services. Cablevision thus believes that it would be most appropriate to strike a balance between the need to avoid the extreme fragmatation which would be entailed by the use of MSAs and RSAs, or even, for that matter, the 487 Basic Trading Areas identified as Option 1 in the NPRM, and the high level of consolidation that would be entailed by using the 47 Major Trading Areas, which constitutes Option 2. Cablevision believes that the most appropriate balance is achieved by using the 194 telephone LATAs as the basis of grant of 2 GHz licenses. As the Commission also recognizes,

Cablevision believes use of LATAs will maximize efficient integration of PCS into the local telephone infrastructure, since LATAs have served reasonably well as the basis for organizing local telephone service.

VI. CABLE SYSTEMS, AS BROADBAND NETWORK PROVIDERS, ARE UNIQUELY SITUATED TO PROVIDE PCS SERVICE AND DEVELOP PCS INFRASTRUCTURE

As a cable television system operator that has also been operating under experimental PCS licenses for almost two years, Cablevision has reported to the Commission the many unique opportunities cable systems present for the rapid development of PCS. Cablevision believes that cable systems' potential for providing various two-way services, and its ubiquitous presence as a ready infrastructure and networking solution for PCS, all argue strongly for taking a careful look at the inherent benefits that granting PCS licenses to cable system operators would provide.

A. A Set-Aside of PCS Licenses for Cable System Operators Would Help Speed Provision of Service to the Public

Because PCS will use microcell technology, the infrastructure interconnecting these cells will of necessity be a critical component of any PCS system. In order to conserve precious spectrum it is obviously preferable to connect the antenna locations by wire rather than radio. Cable television systems provide an obvious choice for supplying such connections,

and a separate set-aside of PCS licenses for local cable operators should be seriously considered.

As a result of the tremendous growth of the cable industry over the past decade, the pervasiveness of cable plant throughout virtually every metropolitan area in the country is well known. Most, if not all, systems currently have unused capacity that is ideally situated to provide the backbone infrastructure for PCS. In particular, the 25 MHz of "upstream" (i.e. subscriber to head-end) capacity engineered into many cable systems, including Cablevision's, is particularly well-suited to the provision of PCS. Many operators are also putting in place "star architectures" using fiber optic cable, rather than "tree and branch" architectures, which can serve as the basis for a cost effective PCS architecture with centralized electronics and intelligence on the nodes of the "star."

In contrast to the proposed set-aside for cable operators, no such set-aside should be made for local exchange carriers. In many cases LECs still retain cellular licenses in their local market areas,[15/] and assuring them a PCS license would only further their already formidable market power. Grant of PCS licenses on a dedicated basis, combined with LECs' control of local bottleneck facilities, would also create incentives to

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[15/] NPRM at ¶ 73 n.50.

stifle PCS competitors in favor of their own affiliates.[16/] In addition to these competitive concerns, LECs do not offer the same amount of bandwidth as close to the end user as do cable systems, and cable systems' 25 MHz of upstream capacity far exceeds the effective bandwidth available at likely microcell location points in the telephone network.

B. The Commission Should Ensure Nondiscriminatory Access To Pole Attachments For Cable-Based PCS Services

Past experience demonstrates that the potential for anti-competitive behavior on the part of utility pole owners exists whenever new service providers seek access to those poles.[17/] Accordingly, Cablevision recommends that the Commission

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[16/] Contrary to the suggestion in the NPRM at ¶ 74, encouraging LEC participation in PCS is unlikely to cause LECs to make better interconnection opportunities available to all PCS providers. There is substantial evidence in the cellular context that LECs elected to make inferior interconnection available to both their own wireline affiliates and nonwireline competitors, rather than improve interconnection for all. See, e.g., In the Matter of the Need to Promote Competition and Efficient Use of Spectrum for Radio Common Carrier Services, 2 FCC Rcd 2910, 2911 (1987), recon., 4 FCC Rcd 2369 (1989). This inclination is likely to be magnified in the context of PCS, since, as the Commission recognizes, PCS may very well compete with basic telephone service offerings to a far greater extent than cellular.

[17/] See, e.g., Heritage Cablevision Associates of Dallas, L.P. v. Texas Utilities Electric Co., 6 FCC Rcd 7099 (1991), recon. denied, 7 FCC Rcd 4192 (1992) (utility company's attempt to charge higher prices for pole attachments used in the provision of data transmission service ruled a violation of Section 224 of the Communications Act); Telephone Company - Cable Television Cross Ownership Rules, Notice of Inquiry, FCC No. 87-243 at ¶ 9 (rel. Aug. 18, 1987) (noting history of telephone company abuse concerning pole attachments).

affirmatively state in this proceeding that cable television operators who provide PCS-type services are entitled to the protection of Section 224 of the Communications Act.

In the absence of state regulation, Section 224 requires the Commission to regulate the rates, terms, and conditions for "any attachment by a cable television system to a pole . . . owned or controlled by a utility" (emphasis added). Not only has this language been interpreted to include the provision of data transmission services, the Commission has also stated that "a cable operator may seek Commission-regulated rates for all pole attachments within its system, regardless of the type of service provided over the equipment attached to the poles."[18/] Under this proper interpretation of Section 224, it is indisputable that the use of utility poles by a cable system in the provision of PCS services would also qualify as "any" attachment, and the Commission should so state to avoid needless controversy on this issue.

C. The Commission Should Not Artificially Restrict PCS Applications

Cablevision has always believed that PCS holds potential in mobile voice and data transmissions. Dating back to its original proposals, however, Cablevision has envisioned broader, multi-media applications of PCS to include two-way services such as

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[18/] Heritage Cablevision, 6 FCC Rcd at 7101 (emphasis added).

impulse pay-per-view and video-on-demand, in addition to meter reading, energy management, and home security. By enhancing the upstream communication path of the cable network, cable-based PCS technology and services could reach an entirely new level and breadth of service applications heretofore only imagined.

PCS presents a unique opportunity for introducing these interactive capabilities, which so far have been slow to develop, without the need for expensive upgrades in the cable "drop line" to and within each subscriber's home. For various technical reasons (e.g. the susceptibility of cable in the home to unwanted and uncontrollable signal ingress), it is this final link in the cable network, not the trunk and feeder lines, that currently imposes the most limitations on service enhancements. PCS provides a way around these technical limitations, bypassing the drop line altogether, or at a minimum, for upstream communications. By taking full advantage of PCS-type technology and services, cable systems could provide numerous service offerings that a stand-alone PCS licensee, without access to the additional bandwidth of coaxial cable or fiber in the trunk and feeder lines, would simply not be able to provide. Moreover, cable-based PCS may permit a greater level of facilities-based competition in telecommunications services generally.

The utilization of PCS spectrum for such services is an appropriate use of the unique capabilities that PCS presents. The Commission has recognized that PCS service offerings should not be limited to any particular type of service (see, e.g.

NPRM ¶ 130 (PCS licensees "should have the flexibility to determine which PCS services are the most needed and to provide those services by the most advantageous technology")).[19/] To the extent, however, that the Commission's proposals would limit these multimedia applications of PCS, including fixed applications, such limits are inconsistent with the public interest.[20/]

CONCLUSION

The Commission has the opportunity in this proceeding to usher in a true revolution in communications in this country. By granting the technical, regulatory, and competitive freedom to allow PCS operators to explore the boundaries of this exciting new service potential, the Commission would foster the development of PCS as a key component of the telecommunications infrastructure. Taking advantage of the existing cable wireline networks already in place throughout the country is clearly the best method to ensure that PCS is made available to the public at the lowest possible price as quickly as possible, and special

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[19/] Such an approach was also taken recently by the Commission in allowing the flexible use of cellular frequencies. See In the Matter of Amendment of Parts 2 and 22 of the Commission's Rules, 3 FCC Rcd 7033, 7041 (1988) ("individual... operators are in the best position to determine how auxiliary services might be offered in the most efficient manner"), recon., 5 FCC Rcd 1138 (1990).

[20/] A broad range of PCS applications, including fixed applications, also broadens the base of revenues from which PCS licensees can undertake the substantial investments in state-of-the-art facilities required for a robust PCS service.

steps should be taken to assure that interested cable operators are given the opportunity to participate in the PCS revolution.

Respectfully submitted,

CABLEVISION SYSTEMS CORPORATION

Charles D. Ferris
James A. Kirkland
Keith A. Barritt
Mintz, Levin, Cohn, Ferris,
Glovsky & Popeo, P.C.
701 Pennsylvania Ave., N.W.
Suite 900
Washington, D.C. 20004
(202) 434-7300

Its attorneys

Date: November 9, 1992

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EXHIBIT I

INITIAL SPREAD SPECTRUM TESTING RESULTS

Cablevision has spent much time in developing a baseline model against which to test any of the planned emerging technologies to be used in PCS applications and deployment. While it can be generally assumed that FDMA (frequency division multiple access) technology will not be used for the eventual provision of PCS since the relative spectrum efficiency of this method does not compare to some of the more elegant technologies such as spread spectrum, it is also true that much is known about the propagation modeling and interference performance of this mature technology.

The work and testing previously reported to the Commission in our quarterly activity reports demonstrate an extremely usable and robust system that is relatively lacking in the traffic stacking potentials of CDMA (code division multiple access) spread spectrum transmission and in the non-interference to established primary user categories. Cell coverage and spacing criteria, however, model themselves much along the lines as predicted by Cablevision in its early proposals, as well as the models predicted and theorized by others throughout the process. Further comfort can be gained by the fact that the design models also agree with and track the manufacturer's performance goals for the equipment.

It is clear that due to the scarcity of available spectrum for emerging technologies the allure of spread spectrum transmission is virtually irresistible, and it is also understandable that a vast body of work has gone into proving the claims of co-existence with existing frequency users. This ability added to the fact that traffic loading efficiency may be increased six to tenfold over established FDMA (i.e., cellular) systems certainly justify the efforts undertaken to prove the non-interference hypothesis.

Cablevision agrees that it is of primary importance to preserve the operation of existing users of microwave channels even in the face of the emergence of as potentially exciting an application as PCS. Prior to any testing in the proposed PCS bands, Cablevision instituted frequency studies to both ensure the proper continued operation of existing users as well as to identify the possible interference criteria necessary to validate our testing. Some of the charts developed from these surveys are included elsewhere in Cablevision's comments. As can be seen from these charts, microwave usage, particularly by government and public safety institutions, is quite high, at least in the areas applied for by Cablevision as

part of the PCS process. It is also clear from these charts that the non-interference potential of this spread spectrum technology is of paramount importance.

Cablevision has been actively testing, over the last few months, the impact of the introduction of spread spectrum technology on our previously mentioned benchmark FDMA testing. While it is also true that this testing is being done in a different frequency band than our previous FDMA testing, the effects of propagation are well understood and have minimal impact for these purposes. Our testing, however, is in its early stages (as is the available equipment, for that matter) and we will completely include the contribution of the transmission effects in the 2GHz band over the 800MHz band in our future studies and reports. Our early testing has, however, shown some disturbing operational anomalies, especially in light of the importance of this issue to the policy questions raised in the NPRM.

Spread spectrum transmission for communications works because, simply speaking, the power of the carrier is *spread* over a particular bandwidth and the robustness of the various spreading algorithms and digital coding technology can work in very hostile ambient noise environments. Additionally, it is this effect of the spreading of the necessary power over the allocated band, rather than the more standard concentration of power on a single narrow carrier, that allows for the non-interference potentials of this particular technology. As reported in great detail by the developers of this technology, it is vitally important to have some type of power control over the users of a spread spectrum system in order to best maximize the usage potential of the systems, in terms of overall traffic (user) potentials. The proposed spread spectrum systems all share a common noise floor threshold point, the point at which no further traffic (users) can be allowed access to the system. This situation is somewhat analogous to all channels being occupied in an FDMA operation. As stated earlier, one of the perceived advantages to CDMA spread spectrum transmission, in addition to its ability to coexist with established frequency users, is the predicted ability to increase traffic loading potentials six to tenfold over an FDMA operation.

A situation that Cablevision has experienced in all of its recent testing of spread spectrum technology is that while the operation of the microcell does not appear to have any detrimental effect on incumbent spectrum users, the existence of any microwave users near the band of our microcell operations has the effect of raising the ambient noise floor to a